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EPA'S WASTE MINIMIZATION RESEARCH PROGRAM

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Waste minimization is viewed by the Agency as a desirable and viable alternative to hazardous waste disposal. The Hazardous Waste Engineering Research Laboratory, in conjunction with the Office of Solid Waste, is developing a Waste Minimization Program for implementation in Fiscal Year 88. Information on these efforts is discussed.

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Waste minimization has been with us for many years. In fact, experience has shown that companies which have the most successful approach for dealing with their waste streams practice waste minimization as an integral part of their waste management.

There is a national policy in the United States to eliminate the generation of hazardous waste. The U. S. Congress stated in the Hazardous and Solid Waste Amendments of 1984 to the Resource Conservation and Recovery Act of 1976:

> The Congress hereby declares it to be the national policy of the United States that, wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated should be treated, stored or disposed of so as to minimize the present and future threat to human health and the environment.

Reflecting the intent of this policy, the EPA and other public agencies have adopted similar variations of the hierarchy shown below as a guide for hazardous waste management options:

1. Waste reduction: reduce the amount of waste at the source through changes in industrial processes;

2. Waste separation and concentration: isolate hazardous materials from mixtures in which they occur;

3. Waste exchange: transfer wastes through clearinghouses so that they can be recycled in industrial processes;

4. Energy/material recovery: reuse and recycle wastes for the original or some other purpose, such as for materials recovery or energy production;

5. Incineration/treatment: destroy, detoxify, and neutralize wastes into less harmful substances; and

6. Secure land disposal: deposit wastes on land using volume reduction, encapsulation, leachate containment, monitoring, and controlled air and surface/subsurface water releases.

The term "waste minimization" has been defined differently by different organizations. The USEPA, in its October 1986 Report to Congress on the minimization of hazardous waste, defined waste minimization as:

> The reduction, to the extent feasible, of hazardous waste that is generated or subsequently treated, stored, or disposed of. It includes any source reduction or recycling activity undertaken by a generator that results in either: (1) the reduction of total volume or quantity of hazardous waste or (2) the reduction of toxicity of hazardous waste, or both, so long as the reduction is consistent with the goal of minimizing present and future threats to human health and the environment.

There is a statement in the waste generator's certification that is included on the uniform hazardous waste manifest that must be signed by all hazardous waste generators in the U. S. who ship hazardous waste off-site for treatment, storage and disposal. It reads,

> If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage or disposal currently available to me which minimizes the present and future threat to human health and the environment, or, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Its inclusion on the manifest was required by the Hazardous and Solid Waste Amendments of 1984 as one of several items related to encouraging waste minimization as a means of reducing environmental problems.

Waste minimization techniques include material changes, process modification, volume reduction, and recovery and reuse. Examples of each are shown in Table 1.

Several barriers that inhibit implementing waste management actions can be overcome by a cooperative attitude by plant management. These barriers are such things as:

- Lack of awareness;
- A "hands off the process" attitude caused by fear of upsetting a product's quality;

TABLE 1

EXAMPLES OF WASTE MINIMIZATION TECHNIQUES

Technique	Industry	Examples of Applicability
Material Change	Printing	Substitute water-based for solvent-based ink.
	Office Furniture	Use water-based paints in place of solvent-based paints.
	Aerospace	Replace cyanide cadmium plating bath with non-cyanide bath.
	Ink Manufacture	Remove cadmium pigment from products.
Process Modification	Chemical Reaction	Optimize reaction variables/ reactor design; optimize reactant addition method; eliminate use of toxic catalysts.
	Surface Coating	Use airless air-assisted spray guns; use electrostatic spray coating system; control coating viscosity with heat units; use high solid coatings.
In-Plant Recycling	Metal Fabricators	Recover synthetic cutting fluids using a centrifuge system.
	Paint Fabricating	Use distillation unit to recover cleaning solvents.
	Printed Circuit Boards	An electrolytic recovering system used to recover copper and tin/ lead from process wastewater.
	Power Tools	Recover alkaline degreasing baths using ultrafiltration.
Volume Reduction	Printed Circuit Boards	Use filter press to dewater sludge to 60% solids and sell sludge for metal recovery.
	Pesticide Formulation	Use separate baghouses at each process line and recycle collected dust into products.

- o Organizational inertia--"if it isn't broken, don't fix it" attitude;
- o Internal politics of the organization (for example, an innovator may feel inhibited by a fear of the lack of management's support); and
- o An "it can't be done" attitude; people may reject an innovative approach merely because it is outside their range of experience.

EPA is placing greater emphasis on waste minimization in its programs. In a report to Congress, EPA concluded that while mandating performance standards was not required at this time, "aggressive action in favor of waste minimization is clearly needed." The report recommended an approach based on a core waste minimization program, information gathering, and some longer-term options. Four points of the technology portion of the waste minimization program of EPA relate directly to dissolving technical barriers and providing the support for the individual programs contained in the Agency's strategy to provide waste minimization. The four relevant points are:

1. Provision of technical and information assistance programs;
2. Assistance to states to develop direct technical assistance programs;
3. On-going broad R&D projects; and
4. Develop a waste minimization information system.

The conclusion of the Report to Congress states,

> Incentives for waste minimization are already strong, so EPA must capitalize on them. Most lacking is access by generators to the information that will demonstrate the economic benefits of waste minimization to industry, overcome logistical problems, and help develop creative new approaches. This can be provided by a strong technical assistance and information transfer effort, which can achieve through voluntary means what would be inefficient and possibly counterproductive to attempt through regulation.

The new emphasis on waste minimization by EPA is contained in six individual programs.

1. Waste Reduction Innovative Technology Evaluations (WRITE) Program
   A major program to evaluate and/or demonstrate good ideas, processes, and technologies that achieve hazardous waste minimization. Projects are to be carried out at the facilities of large and small businesses. Some cost sharing with small businesses may be appropriate.
2. Waste Reduction Evaluations at Federal Sites (WREAFS)
   A series of evaluation and demonstration projects for waste reduction

conducted cooperatively by the EPA and various parts of the DOD, DOE, and other Federal Agencies.

3. Waste Reduction Audit Protocols (WRAP) Program
   A program to develop and test in actual manufacturing facilities, waste reduction assessment procedures suitable for identifying potential waste reduction opportunities. An individual subprogram will be developed for each of the major hazardous waste generating sectors.

4. Waste Reduction Research Support (WRRS) Program
   A program with various Universities for long-term research on the development of process changes and substitute feedstocks that will enhance waste management possibilities.

5. Waste Reduction Technical Assistance Program (WRTAP)
   A contractor-supported in-house activity to coordinate and encourage the dissemination of information on waste minimization that results from the EPA programs, state programs, and other organizations that generate relevant information. Included in this program area is the development and maintenance of an easily accessible data bank for waste minimization techniques.

6. Waste Reduction Institute for Senior Executives
   An important part of the Agency's proposed waste minimization strategy to reduce technical barriers to the furtherance of waste minimization is the establishment of an institute of some 25 senior engineers and scientists with experience in the various waste generating industries. It is expected that many of the institute members will be retired from distinguished careers in industry. The overall purpose of the group, which will be supported through a cooperative agreement with a yet-to-be-determined appropriate professional association (AAEE, AIChE, ASME, etc.), will be to assist the Agency in carrying out the various parts of the program. It is envisioned that such assistance might take the form of reviewing and commenting on individual project proposals, participating as lecturers in WRTAP seminars, participating in the WRAP program as technical experts and providing general advice and support to the in-house staff.

We believe the program outlined above will aggressively promote waste minimization practices in a manner that will be acceptable to industry. The information provided by the program should help overcome the barriers described.

To make this program work, we need the cooperation of industry managers to give us access to plants where successful waste minimization practices have worked and to participate with us in the conduct of the program. Obviously, we encourage you in the electroplating and surface finishing industry to join with us in this program.